

of animals. With the exception of the important labours and influence of Cuvier, to which both merited tribute and critical consideration are here accorded, this portion of the subject is dismissed with a scantiness of treatment that is somewhat disappointing. In this work geology and palaeontology are dealt with together, in correspondence with the fact of their close association and concurrent development, for it is only of comparatively recent years that the study of palaeontology has come to be rightly regarded in its true relation to that of zoology.

Fully three-quarters of the volume are occupied by the fourth section, dealing with the newer development of geology and palaeontology, and for convenience of treatment the large mass of material here to be incorporated is divided into seven chapters. In the first three of these the more recent advances in the study of cosmic, physiographical and dynamic geology receive careful and detailed attention. In the third chapter we are presented with an excellent summary of the work of Lyell; while from a good epitome and brief criticism of Suess's "Antlitz der Erde" we learn in what high estimation that work is held by Prof. Zittel. The chapter on the development of dynamic geology is throughout exhaustive; but in attempting to give credit to the work of so many contributors, the author must often impose a tax on the attention of his readers. This will be noticeable, indeed, in all these later chapters of the book, when the historian has approached a period in the development of the science marked by an ever-increasing prolificacy in the production of special publications, and as a result of this effort to give recognition to a legion of authors great and small, the pages show a tendency to become burdened with the mere lists of names of many who have contributed to our knowledge in the respective branches of the subject. A chapter devoted to topographical geology, in which the most prominent position is accorded to Germany, gives useful information regarding the growth of geological surveys.

The three concluding chapters deal with the more recent development of stratigraphy, petrography and palaeontology. In tracing the growth of stratigraphy, the several geological systems are separately treated, and the Triassic System is dealt with at greatest length. The development of study in the Alpine Trias here finds a prominent place, and in this connection it is noteworthy that Prof. Zittel, even when recounting the progress of a recent warmly-conducted polemic discussion on a question of nomenclature, has succeeded in preserving neutrality. Chapter vi. furnishes a brief though comprehensive account of the later development of petrography, in which the principal work of recent years, for the most part without criticism, is recapitulated.

The volume concludes with an account of more recent labours in palaeontology, but it must be with a feeling akin to disappointment that we complete the perusal of this portion of the work. In a chapter dealing with that subject in which Prof. Zittel has acquired his well-merited reputation as the leading authority, the method and fulness of treatment fall below our expectations. The endeavour to refer, though it be by mere mention, to so much that has been of recent years accomplished in this department, and this at the risk of reducing a certain proportion of the text to the character of a mere compen-

dium of authors' names, is here too plainly apparent. By this objective presentation of details the author must in great measure forfeit that interest which a broader and more critical treatment would have commanded.

Great care has been bestowed in editing this work, and such errors as the misspelling of the name "MacCulloch" on p. 165, and the omission of two reference numbers on p. 793, are of rare occurrence. Carefully quoted literature references have been appended, on the whole, with sufficient liberality; but the author's apology for devoting so much space to this purpose appears superfluous, and it must be obvious, especially when looked at from the student's point of view, that frequency in referring to original sources of information can only enhance the value of a book of this kind.

Little need be added in recommendation of this comprehensive work; the terse and lucid style of its author will commend it to English readers. By the completion of his arduous task, Prof. Zittel has well supplied a long-felt want, and all who interest themselves in the study of geology, towards the development of which Great Britain has so conspicuously contributed, will warmly welcome the appearance of this volume from the pen of one who takes rank among the ablest living expounders of a noble science.

F. L. K.

THE FLORA OF NEW ZEALAND.

The Student's Flora of New Zealand and the Outlying Islands. By Thomas Kirk, F.L.S. A Fragment. Pp. vi + 408. Large 8vo. (Wellington, N.Z., 1899.)

List of the Genera and Species of New Zealand Plants. By A. Hamilton. (Wellington, N.Z., 1899.)

IT was well known in botanical circles that the late Prof. Thomas Kirk, of Wellington, New Zealand, who died about a year ago, had long been engaged in the preparation of a comprehensive, descriptive, and illustrated work on the flora of that country; and it was a great disappointment when it transpired that he had left his work in an unfinished state, because it was felt that it would be extremely difficult, perhaps impossible, to find another botanist so well qualified for the task. Prof. Kirk spent some thirty years of his life in the investigation of the flora of his adopted country, and his various writings thereon betoken the careful and accurate botanist. From time to time he published the new species discovered by himself and others; but his fully illustrated "Forest Flora of New Zealand" gave evidence of the extent of his knowledge of his subject. A more remarkable and, in a scientific sense, a more important contribution to the botanical literature of New Zealand is contained in an address delivered before the Philosophical Society of Wellington, N.Z., a few years ago (see *Transactions* of the New Zealand Institute, vol. xxviii.). In this address he dealt with the "Displacement and Replacement of the Native Vegetation of New Zealand" in such a manner as to be of permanent value to science. He has there put on record facts connected with the introduction and colonisation of exotic plants in New Zealand that positively throw a new light, and suggest new ideas, on the present distribution of plants in cultivated countries generally. Fortunately the

botanical investigation of New Zealand was begun before its settlement by Europeans; and it has been continued by a small band of them with such ardour and exactitude, that future workers in the field have a substantial foundation to build upon. In the absence of authentic records, the present conditions in the vegetation of the country could not have been understood. Kirk estimated that about 500 exotic species of plants had become more or less completely established in New Zealand; and they are spread all over the country, from the sea-coast almost to the altitudinal limits of vegetation. But the most surprising part of it is the extent to which vigorous native plants have been displaced by comparatively delicate foreigners; and it would indeed be incredible in the absence of indisputable evidence. However, I must not pursue this subject here, and I have only alluded to it in connection with the plan and scope of the fragment of Kirk's "Flora" before me. The Government wisely decided to publish so much of this work as was printed off, or ready for the printer, at the time of the author's death. This contains the natural orders Ranunculaceæ to Compositæ, in the sequence of Bentham and Hooker's "Genera Plantarum"; and its value only makes one wish that the author had lived to complete it. Perhaps the only serious criticism one could fairly bring to bear upon the work before having had considerable practical experience in using it for the determination of species, is its size and weight, which would preclude its being used in the field. Rather less than half of the known flowering plants (671), and 260 introduced plants, are described on some 360 pages. Completed on this scale it would make, with glossary, index, &c., at least 850 pages. By using a smaller type with less spacing, and a lighter paper, it would be possible to reduce the book to pocket dimensions. This objection has been raised here, because we believe the New Zealand Government is making arrangements with another botanist to write a complete Flora.

It might be suggested that the introduced plants should be left out; but, considering that they constitute something like a third of the number of species occurring in a wild state, that some of them are dispersed from one end of the islands to the other, and that in some districts or localities introduced plants preponderate, it is as absolutely essential that they should be included as that the European element should figure in any account of the present inhabitants of New Zealand. To begin with, the young student cannot distinguish between the introduced and indigenous elements. To the beginner, one is as good as the other, and, as a matter of knowledge, to know the one is of as much importance as it is to know the other; and we think it would be a grave mistake to exclude the foreign element from a book treating of the flora of the country. Kirk gives less detailed descriptions of them, and prints them in a smaller type, so there is no difficulty in distinguishing between the two.

When we come to consider the question, "What have the discoveries made since the publication of Sir Joseph Hooker's 'Handbook of the New Zealand Flora,' in 1864, added to our knowledge of phytogeography?" the answer must be "next to nothing." Perhaps the most interesting thing in this connection is the discovery of a

number of Tasmanian species, especially on Stewart Island, in the extreme south. The outlying islands, such as Macquarie, Antipodes, and the Kermadecs, have been more fully explored; but the results merely go to strengthen the previously conceived idea that the highest southern vegetation, like the highest northern, is very much the same all round the world.

With regard to botanical discoveries in New Zealand since 1864, it may be truly said that they are of comparatively little interest. Only one new generic type (*Tetraechontra*) of a really distinct character has been found, and this is a minute herb, having the habit of *Tillaea*. It is of anomalous structure, and has been provisionally placed in the Boraginaceæ, though it has opposite leaves. Two new genera have been proposed for species formerly referred, in part, at least, to the curious leguminous genus *Carmichaelia*. The differential characters are chiefly in the form of dehiscence of the pods. Perhaps the very rare and imperfectly known *Siphonidium*, allied to *Euphrasia*, deserves generic standing, but it is almost certainly a congener of Hooker's section *Anagosperma* of *Euphrasia*, which has recently been raised to generic rank.

Coming to species, it is true that the number has been nominally increased by upwards of one-third. In other words, more than 500 species of flowering plants have been proposed in addition to the 935 described by Hooker; but of these probably not less than a third will prove untenable. For instance, in *Olearia*, Kirk retains thirty-four species, and reduces a dozen of the so-called new ones. As compared with what was previously known, there are few striking plants among the recent discoveries. The majority of the new species belong to such familiar genera, of almost world-wide range, as *Ranunculus*, *Epilobium*, *Senecio*, *Veronica* and *Carex*, and to such characteristic Australasian genera as *Coprosma*, *Olearia*, *Celmisia*, *Carmichaelia* and *Astelia*. Among Australian genera, not previously found in New Zealand (as distinguished from Australasian), new or old species have been recorded of *Actinotus*, *Liparophyllum*, *Caleana* and *Calochilus*.

I have not entered into strict criticism of the late Prof. Kirk's work, because, had he been spared, he might have corrected errors and made good many omissions; but I may mention that the derivation of generic names is partially given; the same of the native countries of introduced plants; several published names have been overlooked; and a key to the species of *Oxalis* is wanting.

The illustrations referred to in the opening sentence of this notice are to be issued in a separate volume. They will include the unpublished Banksian copper-plates of New Zealand plants, kindly placed at the disposal of the New Zealand Government by the Trustees of the British Museum. I may note in this connection that the Trustees have now made provision for the reproduction of the whole of the valuable collection of plates, about 700 in number, engraved at the expense of Sir Joseph Banks, but never printed; and illustrating the botany of Cook's voyages.

In conclusion, I may add that Mr. Hamilton's list of the flowering plants will be found useful, as it contains references to the place of publication, mostly in the

Transactions of the New Zealand Institute. In consequence of the want of a good botanical library, some species described in European publications are not included.

W. BOTTING HEMSLEY.

ENCYCLOPAEDIA BIBLICA.

Encyclopaedia Biblica. Edited by Rev. T. K. Cheyne, D.D., and J. S. Black, LL.D. Vol. i. A to D. Pp. xxviii + 572. (London : A. and C. Black.)

In this work we have an illustration of the fact that similar ideas spring up contemporaneously in different minds. In the same year in which Dr. Hastings' "Dictionary of the Bible" reaches its second volume extending to the letter K, we have the first volume of the work here under review issued to the public. Both have their source and publishers in Edinburgh, testifying to the high interest which Scotland has ever shown in Biblical criticism and Biblical subjects. To us it appears that both works are very much on the same lines, though the writers of the articles are for the most part different, and include those of other nationalities besides British. It would be difficult to say why one of these works takes the title of an "Encyclopaedia" and the other of a "Dictionary," as the articles in both are equally elaborate and comprehensive. Perhaps, in the case of the latter, the idea of a dictionary, as first contemplated, gradually expanded in the minds of the editors, and under force of circumstances, till it became merged in that of an encyclopædia ; the more recent work has had the advantage of starting with the more ambitious title. Both works, however, have had their origin in the late Dr. Smith's invaluable "Bible Dictionary," which for many years past has been a companion to students of Holy Scripture. But so great has been the advance in the critical study of the sacred pages, as well as in our knowledge of Bible lands, for which we are largely indebted to the labours of the committee of the "Palestine Exploration Fund," that a new work embodying these investigations has become a necessity which the authors of both the Dictionary and Encyclopaedia have endeavoured to meet.

In looking over the subjects bearing upon natural history and topography within the compass of this volume, extending to the letter D, we observe little that requires criticism. The word "adamant" is considered to be corundum rather than the diamond, which was unknown out of India till the time of Alexander's successors ; at the same time it is not impossible that the stone translated diamond in Exodus xxviii. may have been simply quartz, or rock crystal, which is inferior in hardness to either corundum or the diamond, and, therefore, capable of being engraved with the name of one of the tribes. Needless to observe that the rendering into Greek, Latin or English of the precious stones of the Old Testament will ever be attended with much uncertainty.

The description of the Dead Sea by Prof. Gautier is lucid and correct as regards its present condition ; and we are glad to observe that he gives no countenance to the view that the waters of the Jordan once ran into the Gulf of Akabah, which would have required that their surface in the position of the Dead Sea must have risen, not only to the level of the Red Sea and Mediter-

ranean, which was the case, but higher by about 650 feet ; of this supposed high level there is no evidence in the form of old terraces in the Arabah Valley, as is the case with regard to the Mediterranean level. The geological changes which have brought about the formation of the Dead Sea basin may be looked for in a future volume, under the head of Palestine.

Under Deluge the various myths and legends found in countries widely separated are related in much detail by Dr. Cheyne and Prof. Zimmern. That the Hebrew tradition, as contained in Genesis, had its origin in Babylonia there can be no doubt, as the late Mr. George Smith has shown in his remarkable work, "The Chaldean Account of Genesis" (1876). But the question still remains to be decided—whether the original story had its origin amongst a myth-generating people or in the tradition of an actual physical catastrophe, such as a great inroad of the sea due to subsidence of the land in prehistoric times. This latter is the view taken by Lenormant in "Les Origines de l'Histoire," supported by Sir J. William Dawson, and more recently by Sir Joseph Prestwich. The Biblical story of the Deluge is necessarily restricted to the Euphrates Valley ; but the more widely extended tradition seems to imply a more extended region wherein there was a submergence of the lands during the human period. Of such submergence we have ample evidence in many countries, including the British Isles, Northern Europe and Scandinavia, the Nile Valley, and Western Palestine. Such movements have left their vestiges in the high-level gravels with existing shells, and are certainly of more recent date than the early Glacial stage, the close of which may be assigned as the age of man. According to Dawson, this subsidence of the land after a period of high elevation brought about the extinction of palaeocosmic man, an inhabitant of caves, and a mighty hunter before the Lord, like Nimrod. We must beware of watering down what is really founded on a historic basis in the Bible into legend. When we find the patriarch Abraham treated "not so much an historical personage as an ideal type of character, on the ground of the 'dreamy, grand, and solemn' impression which this patriarch makes upon us," we may well pause and ask whether this process of idealism is to extend to succeeding characters, such as Isaac, Jacob, Moses, David and the rest ; and whether the whole of the Old Testament is not to be regarded in the same light as the "Æneid," the "Odyssey," or "Paradise Lost"? We protest against this extravagance of criticism. Whatever may have been the mythical origin of the earlier chapters of Genesis, the historical narrative clearly commences with the call of Abraham, and the history of that "grand personage" claims to be treated with as much scrupulous deference as any personality of ancient history. As Prof. H. E. Ryle observes—

"the endeavour to find in Abraham's story a philosophical description of abstract qualities seems to presuppose a stage of literary development to which the materials of the Hexateuch can make no claim, and to desiderate a literary unity which those materials emphatically contradict."

With such exceptions as the above the work must be accorded very high literary merit coupled with wide research.

E. H.